Chairman's Air Pollution Seminar Series

Wednesday July 11, 2001
1:00 p.m. to 2:00 p.m.
Confrence Room 2210, 22nd Floor, Cal/EPA Building
1001 I Street, Sacramento

Whole Ecosystem Measurements of Biogenic Hydrocarbon Emissions: Impacts on Ozone and Aerosol Formation

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On a global scale, biogenic emissions of VOCs are estimated to exceed anthropogenic emissions by roughly a factor of ten. On a regional scale, in and downwind of urban areas, the relative importance of anthropogenic and biogenic VOC emissions is dependent on the rates of anthropogenic emissions, the type and density of vegetation, and the light and temperature conditions that drive biogenic emissions. Accurate in-situ measurements of biogenic emissions of VOCs are crucial for our understanding of both the environmental parameters controlling emissions and their effects on tropospheric ozone and aerosol formation.

Under ARB funding we have done research on biogenic VOC emissions in a ponderosa pine plantation at Blodgett Forest, a site that is typical of the mid elevation Sierra Nevada Mountains. We have collected the first canopy-scale, continuous, long-term flux measurements of a range of atmospherically active hydrocarbons including methylbutenol, ethanol, methanol, acetone, acetaldehyde, and a suite of monoterpenes. The field study data has been analyzed to understand the ecological and physical processes that control emission rates for use in improving and developing emission model algorithms. Analyses of concentrations of ozone, isoprene, and isoprene's oxidation products have shown that a substantial amount of the ozone observed at the mid elevations of the Sierra Nevada Mountains was formed through oxidation of isoprene that was biogenically emitted from oak trees in the foothills. On hot days when isoprene emissions were highest, ozone production in this region was
dominated (more than 50%) by isoprene oxidation. We are beginning a new contract with ARB on measurements of monoterpene emissions to be used as inputs for the BEIGIS Aerosol model and for validation of the BEIGIS-Secondary Organic Aerosol Simulation Platform.

Allen H. Goldstein – *is an associate professor of biogeochemistry at University of California at Berkeley and a core member of the Berkeley Atmospheric Sciences Center. Professor Goldstein's research addresses the interactions between atmospheric chemistry and terrestrial biogeochemistry, and how these interactions influence biosphere-atmosphere exchange and determine atmospheric composition. His recent focus has been on the interface between natural and anthropogenic influences on regional photochemistry, including formation of ozone and aerosols, as well as deposition and other loss processes. He initiated a major new research program after arriving at UC Berkeley in 1996, studying biosphere-atmosphere exchange of hydrocarbons, ozone, carbon dioxide, water, and energy in a ponderosa pine plantation, focusing on the physiological controls on trace gas exchange, impacts of typical management practices, and interactions with atmospheric chemistry. For this work, he and his research group established a highly instrumented AmeriFlux site at Blodgett Forest that is now operational year-round.*